

## Iodine-Compatible C12A7 Electride Hollow Cathode, Phase I

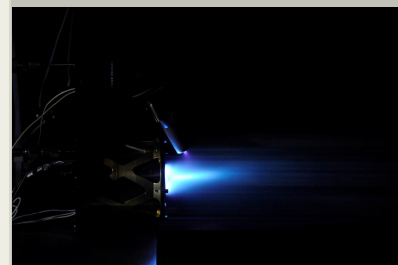
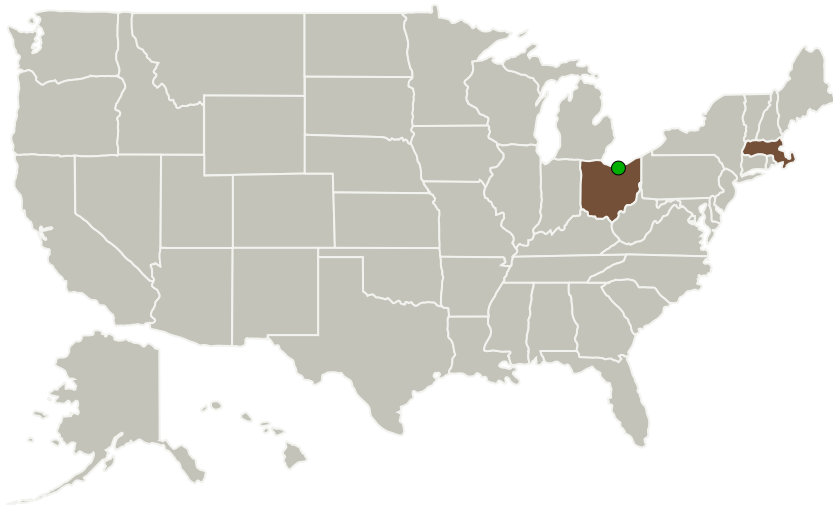
Completed Technology Project (2015 - 2015)



## Project Introduction

Iodine is highly attractive as an alternate electric propulsion propellant to xenon. It is easily stored in a compact volume on a spacecraft as a solid (greater than twice the storage density than pressurized xenon), which negates the need for a large pressurized tank. This, combined with its low cost and lower ionization energy, makes iodine an ideal propellant for a smallsat Hall thruster system. Currently, the heaterless C12A7 electride hollow cathode is the only low power electron source available to operate with an iodine electric propulsion thruster. C12A7 electride is a conductive ceramic with a measured work function of 0.76 eV. Busek proposes to mature the heaterless C12A7 electride hollow cathode technology to be conducive to low power applications and compatible with an iodine propellant. The proposed Phase I effort will focus on the design and fabrication of a durable C12A7 electride insert that will be compatible with future efforts to produce a qualification model cathode. Potential insert designs will be evaluated based on their operation within a laboratory model cathode body. The designed insert will be incorporated into an iodine-resistant cathode barrel and keeper and the full cathode will be characterized and delivered to NASA.

## Primary U.S. Work Locations and Key Partners



Iodine-Compatible C12A7  
Electride Hollow Cathode, Phase  
I

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Organizations Performing Work	Role	Type	Location
Busek Company, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

## Primary U.S. Work Locations

Massachusetts	Ohio
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## Project Transitions

**June 2015:** Project Start**December 2015:** Closed out**Closeout Summary:** Iodine-Compatible C12A7 Electride Hollow Cathode, Phase I Project Image**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/139140>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Busek Company, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

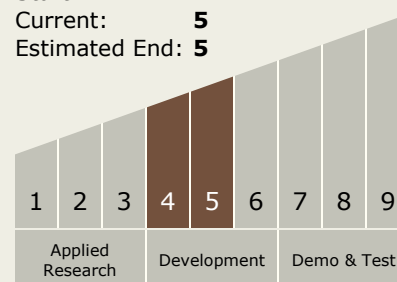
Lauren Rand-lee

## Technology Maturity (TRL)

Start: 4

Current: 5

Estimated End: 5



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## Images



### Briefing Chart Image

Iodine-Compatible C12A7 Electride  
Hollow Cathode, Phase I  
(<https://techport.nasa.gov/image/136320>)

## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.2 Electric Space Propulsion
    - └ TX01.2.2 Electrostatic

## Target Destinations

The Sun, Earth, The Moon,  
Mars, Others Inside the Solar  
System, Outside the Solar  
System